R E M A R K S

Reconsideration of this application, as amended, is respectfully requested.

THE CLAIMS

Independent claims 1 and 6 have been amended to clarify that the helical screw rotor expander comprises two helical co-acting rotors surrounded by a housing, and that the rotors together forming a plurality of V-shaped working chambers which, due to rotation of the rotors, travel in a direction from the inlet port towards the outlet port and continuously increase in volume at least during a part of said traveling. In addition, independent claims 1 and 6 have been amended to clarify that the intermediate pressure port communicates with the helical screw rotor expander where a given V-shaped working chamber is increasing in volume and is closed from communication with both the inlet port and the outlet port. See Figs. 3 and 4, and the disclosure in the specification at, for example, page 5, line 5 to page 6, line 32. No new matter has been added, and it is respectfully requested that the amendments to the claims be approved and entered.

THE PRIOR ART REJECTION

In the Advisory Action, the Examiner has maintained the rejections set forth in the Final Office Action whereby claims 1-9

were rejected under 35 USC 103 as being obvious in view of the combination of USP 5,327,987 ("Abdelmalek") and USP 3,097,490 ("Callan et al") as well as in view of the combination of Abdelmalek and USP 3,994,137 ("Yasumoto et al"). These rejections, however, are respectfully traversed with respect to the claims as amended hereinabove.

According to the present invention as recited in amended independent claim 1, there is provided a method of controlling a closed heating system for generating energy from heat by controlling a flow of a working medium through an expansion device included in the closed heating system which, in addition to the expansion device, also includes a condenser, a pump and a boiler, wherein the expansion device comprises a helical screw rotor expander that has an inlet port, and an outlet port connected to an inlet of the condenser, wherein the helical screw rotor expander comprises two helical co-acting rotors surrounded by a housing, said rotors together forming a plurality of V-shaped working chambers which, due to rotation of the rotors, travel in a direction from the inlet port towards the outlet port and continuously increase in volume at least during a part of said traveling, wherein the condenser comprises an outlet connected to an inlet of the pump, the pump comprises an outlet connected to an inlet of the boiler, and the boiler comprises an outlet connected to the inlet port of the helical screw rotor

expander through an inlet line, and wherein the expansion device drives an energy producing device. As recited in amended independent claim 1, the method comprises providing the helical screw rotor expander with an intermediate pressure port between the inlet port and the outlet port, wherein the intermediate pressure port communicates with the helical screw rotor expander where a given V-shaped working chamber is increasing in volume and is closed from communication with both the inlet port and the outlet port, wherein the intermediate pressure port is connected with the inlet line via a branch line between the intermediate pressure port and a branching point in the inlet line, and wherein a valve is included in the branch line, and the flow of the working medium through the valve to the intermediate pressure port is controlled as a function of a state parameter.

Similarly, according to the present invention as recited in amended independent claim 6, there is provided a closed heating system for generating energy from heat including an arrangement for controlling a flow of a working medium through an expansion device included in the closed heating system, wherein the closed heating system further includes a condenser, a pump, a boiler, and requisite connection lines, wherein the expansion device includes a helical screw rotor expander that has an inlet port, and an outlet port connected to an inlet of the condenser, wherein the helical screw rotor expander comprises two helical

co-acting rotors surrounded by a housing, said rotors together forming a plurality of V-shaped working chambers which, due to rotation of the rotors, travel in a direction from the inlet port towards the outlet port and continuously increase in volume at least during a part of said traveling, wherein the condenser comprises an outlet connected to an inlet of the pump, the pump comprises an outlet connected to an inlet of the boiler, and the boiler comprises an outlet connected to the inlet port of the helical screw rotor expander through an inlet line, and wherein the expansion device drives an energy producing device. In addition, as recited in amended independent claim 6, the helical screw rotor expander includes an intermediate pressure port between the inlet port and the outlet port, wherein the intermediate pressure port communicates with the helical screw rotor expander where a given V-shaped working chamber is increasing in volume and is closed from communication with both the inlet port and the outlet port, and wherein a branch line connects the intermediate pressure port with the inlet line at a branching point, and a valve is provided in the branch line.

It is respectfully submitted that the cited prior art references, even if considered in combination, do not achieve or render obvious the above described features of the method and system of the present invention as recited in amended independent claims 1 and 6.

As recognized by the Examiner, Abdelmalek discloses a helical screw expander 300 with a pair of helical rotors 303 and 304. However, it is again respectfully submitted that contrary to the Examiner's assertion on pages 3 and 4 of the Final Office Action, Abdelmalek does not at all disclose or even remotely suggest that the helical screw expander 300 thereof has an intermediate pressure port in the manner of the helical screw rotor expander of the claimed present invention. Instead, Abdelmalek merely discloses a conventional helical screw expander 300 with only an intake 309 and a discharge 310.

If the Examiner disagrees and continues to assert that Abdelmalek discloses or suggests that the helical screw expander thereof has an intermediate pressure port, the Examiner is respectfully requested to specifically point out where in the specification and/or drawings of Abdelmalek the Examiner believes that this reference discloses providing the helical screw expander 300 thereof with an intermediate pressure port in the manner of the helical screw rotor expander of the claimed present invention.

It is noted that in Abdelmalek, gas enters the intake 309 of the helical screw expander 300 at a high pressure and the gas pressure is decreased in the axial direction toward the discharge port 310 of the helical screw expander 300. That is, Abdelmalek can be considered to have an intermediate pressure chamber

between the high pressure intake 309 and the low pressure discharge 310 of the helical screw expander 300. See column 7, lines 15-39 of Abdelmalek. However, it is respectfully pointed out that Abdelmalek does not disclose or even remotely suggest any intermediate pressure port.

Indeed, it is respectfully submitted that Abdelmalek does not at all disclose or suggest the structure of the helical screw rotor expander of the present invention as recited in amended independent claims 1 and 6 whereby the helical screw rotor expander has the intermediate pressure port which communicates with the helical screw rotor expander where a given V-shaped working chamber is increasing in volume and is closed from communication with both the inlet port and the outlet port.

With the structure of the claimed present invention, each of the inlet port, the intermediate pressure port and the outlet port of the helical screw rotor expander are localized axially. In addition, with the structure of the claimed present invention, each working chamber in the helical screw rotor expander goes through five phases during a complete working cycle, the five phases being a first filling phase, a first expansion phase, a second filling phase, a second expansion phase, and an emptying phase.

In the first filling phase, the working medium is delivered through the inlet port to a working chamber at a pressure p

greater than atmospheric pressure, and when communication of the working chamber with the inlet port is broken, the volume of the working chamber increases from zero to a relatively small volume v. In the first expansion phase, the volume of the working chamber rises to v2 (greater than v) as it moves towards the outlet port and consequently, the pressure in the working chamber is reduced to lower than p. The first expansion phase ends and the second filling phase begins when the working chamber starts communicating with the intermediate pressure port, and the pressure in the working chamber again rises to p due to inflow of the working medium though the intermediate pressure port. The second filling phase ends and the second expansion phase begins when the communication of the working chamber with the intermediate pressure port is broken. In the second expansion phase, the pressure in the working chamber again falls to a level of the atmospheric pressure (lower than p). Finally, the second expansion phase ends and the emptying phase begins when the working chamber starts communicating with the outlet port. See the disclosure in Fig. 4 and at page 5, line 27 to page 6, line 32 in the specification.

It is respectfully submitted that since Abdelmalek does not have an intermediate pressure port, the operation of the helical screw expander 300 thereof does not at all correspond to

the operation of the helical screw rotor expander of the present invention as recited in amended independent claims 1 and 6.

Callan et al and Yasumoto et al, moreover, have been merely cited to disclose a branch line from an inlet port, which is connected to an intermediate port of a helical screw rotor expander, and which has a valve being responsive to a state parameter.

Accordingly, it is respectfully submitted that even if all of Abdelmalek, Callan et al and Yasumoto et al were combinable in the manner suggested by the Examiner, any such combination of these references would still not achieve or render obvious the feature of the helical screw rotor expander as recited in amended independent claims 1 and 6 of the present invention whereby the helical screw rotor expander has the intermediate pressure port which communicates with the helical screw rotor expander where a given V-shaped working chamber is increasing in volume and is closed from communication with both the inlet port and the outlet port of the helical screw rotor expander.

Still further, it is respectfully pointed out that, as set forth in the Response filed on May 11, 2009, since Abdelmalek does not have an intermediate port to which branch lines with valves as taught by Callan et al or Yasumoto et al can be connected, this reference is not properly combinable with Callan et al in the manner suggested by the Examiner on page 3 of the

Final Office Action, and it is again respectfully submitted that Abdelmalek is not combinable with Yasumoto et al in the manner suggested by the Examiner on page 4 of the Final Office Action.

Still further, it is respectfully pointed out that, as set forth in the Response filed on May 11, 2009, Callan et al and Yasumoto et al both relate to dynamic expansion devices. By contrast, Abdelmalek relates to a displacement expansion device. For this reason also, it is again respectfully submitted that neither Callan et al nor Yasumoto et al are combinable with Abdelmalek in the manner suggested by the Examiner in the Final Office Action.

Yet still further, it is respectfully submitted that even if the teachings of Abdelmalek were combinable with Callan et al and/or Yasumoto et al in the manner suggested by the Examiner, any such combination would still not achieve or render obvious a branch line provided with the valve as according to the present invention as recited in amended independent claims 1 and 6.

On page 3 of the Final Office Action, the Examiner asserts that the first and last branch lines of Callan et al, which (according to the Examiner) are connected to intermediate ports of the turbine 5, correspond to the branch line of the claimed present invention. However, it is respectfully pointed out that Callan et al does not disclose or suggest that the first and last branch lines thereof are connected to any intermediate ports

communicating with the turbine 5 where a working chamber is increasing in volume and is closed from communication with both an inlet port and an outlet port of the turbine 5. Accordingly, it is again respectfully submitted that the first and last branch lines of Callan et al do not correspond to the branch line of the present invention as recited in the amended independent claims 1 and 6.

Finally, it is noted that on page 4 of the Final Office Action, the Examiner asserts that the branch line 26 of Yasumoto et al, which (according to the Examiner) is connected to an intermediate port of the intermediate turbine 2, corresponds to the branch line of the claimed present invention. However, it is respectfully pointed out that Yasumoto et al does not disclose or suggest that the branch line 26 thereof is connected to any intermediate port of the intermediate turbine 2 communicating with the intermediate turbine 2 where a working chamber is increasing in volume and is closed from communication with both the inlet and outlet ports thereof. Accordingly, it is again respectfully submitted that the branch line 26 of Yasumoto et al also does not correspond to the branch line of the present invention as recited in amended independent claims 1 and 6.

In view of the foregoing, it is respectfully submitted that amended independent claims 1 and 6, and claims 2-5 and 7-9 respectively depending therefrom clearly patentably distinguish

over all of the cited references, taken singly or in combination consistent with the respective fair teachings thereof, under 35 USC 103.

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Entry of this Amendment along with the Response filed on May 11, 2009, allowance of the claims, and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,

/Douglas Holtz/

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